Water budgets of the two Olentangy River experimental wetlands in 2005

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Introduction

Hydrologic conditions are extremely important for the maintenance of wetland structure and function. Biota, water quality and vegetation dynamics determine a wetland's overall water budget (Mitsch and Gosselink, 2000). Since 1994, a combination of manual and automated observations has provided a wealth of information on the daily, and even hourly, water fluxes of the two experimental wetlands at the Olentangy River Wetland Research Park (ORWRP). Previous annual water budgets and flood event descriptions for the experimental wetlands are presented by Wu et al. (1995), Nairn et al. (1996), Mitsch (1996), Wang et al. (1997, 1998), Wang and Mitsch (1999), Zhang et al. (2000), and Zhang and Mitsch (2001, 2002, 2003, 2004, 2005). These reports provide estimates of daily water fluxes and flooding events of the two Olentangy River experimental wetlands for each year. As part of a long-term wetland ecosystem study begun in 1994 in the two experimental wetland basins, the water budget for 2005 is presented here. To allow water budgets to be compiled on a consistent basis, there is a need to follow previous procedures and modeling approaches while integrating observations, in part because of the very abundance of data and also because of the periodic occurrence of atypical events such as floods and equipment malfunctions. These procedures were used as a model in developing the 2005 wetland water budgets.

In January 2003, we started a pulsing experiment for the two experimental wetland basins whereby floods were introduced to each wetland basin. This pattern was continued in 2004 beginning in the winter. After two years of pulsing, 2003–2004, we changed in March 2005 to non-pulsing (e.g., steady-flow) hydrologic conditions for the experimental wetlands and the billabong.

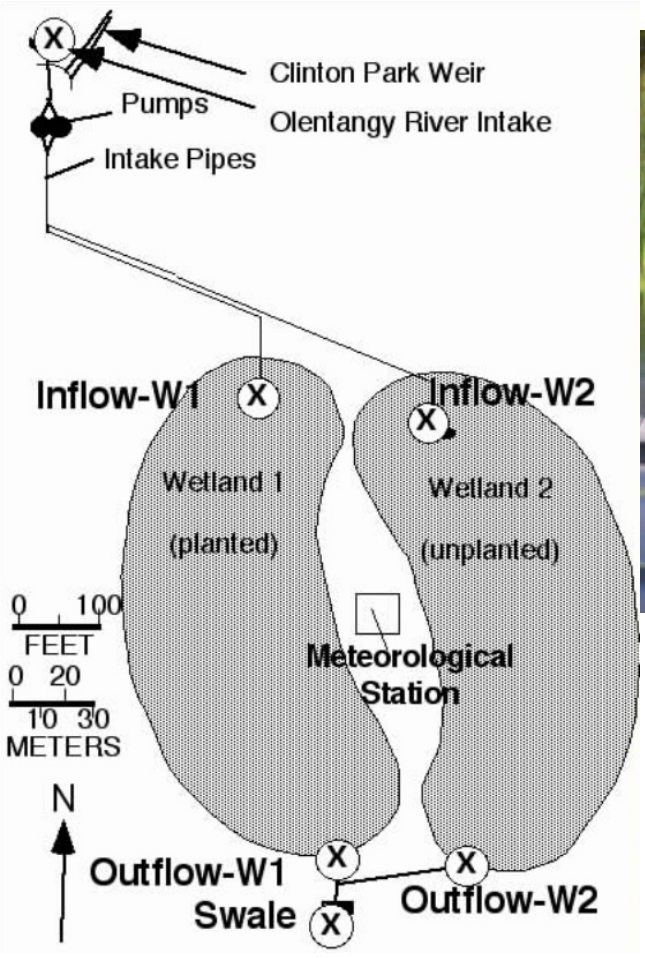

Figure 1. Location of pumped inflows and outflows of Wetland 1 and Wetland 2 at ORWRP. Hydrologic sampling stations are marked, and the inflow of Wetland 1 in 2005 is shown on the right.

Methods

Locations of the inflows and outflows are shown in Figure 1. The following general equation (Mitsch and Gosselink, 2000) was used to determine a water budget for each ORWRP experimental wetland:

$$S_i + F_i + P - S_o - ET - G_o - \Delta V = 0 \quad (1)$$

where,

S_i = pumped inflow (surface)
F_i = flood inflow (due to floods on the Olentangy River)
P = precipitation
S_o = surface outflow
ET = evapotranspiration
G_o = ground water outflow (seepage)
ΔV = change in volume

All parameters were developed in equivalent units for a budget calculation; either average flow rate (i.e., gpm) over a given time period, or total depth (i.e., cm) over a given time period, where total area was taken as a nominal 10,000 m^3 (1 ha) for each wetland. A 4-hour time increment was used as the basis for computing all parameters. However, the budget is reported only for daily values.

Pumped Inflow (S_i)

Nornally, twice-daily (morning and evening) readings of both instantaneous and total integrated volume of pumping rates were collected by staff and students from the flow monitors in each pipe going to each wetland. Many gaps have continued to exist in the data when flow gauges clogged or when readings were missed. When data from only one wetland inflow were available, the missing flow rate was assumed to be the same as the available flow rate (the protocol for the experimental wetlands has been, since the start, to deliver the same flow to each wetland at all times). When both flow gauges were malfunctioning, flow was estimated for both from the best estimate of previous readings or from pump settings (number of turns open) also, staff gages were installed on the inflow pipe of each wetland (Figure 1). The calibration curve was developed for water height of inflow plume versus flow as measured by both the meter and by velocity calibration (Zhang and Mitsch, 2002). When pumps were shut down, either by site managers or by accident, the time of shutdown was estimated from field records and flow was prorated for only the period when pumps were not operating.

For the 2005 budget, readings from the inflow meters were interpolated to determine 4-hour total flow increments, in gallons, for each wetland. Water level recorder data charts, when available, were used to determine exact times of power outages or other unusual occurrences.

Non-pulsing Inflow

We started a non-pulsing, steady-flow experiment for Wetland 1 (W1), Wetland 2 (W2), and the billabong in 2005, and created lower inflow pumping conditions from March–December, 2005.

In March 2005, the natural flooding from the river to the billabong was blocked with a removable bulwark and the inflow to the billabong was attached to the intake plumbing for the two experimental wetlands. The billabong inflow was connected to the main line at the same location where the river water pump for the mesocosm compound had previously been connected. Because the connecting pipe was of smaller diameter than the main line for the experimental wetlands, two butterfly valves were installed on the upright pipestands at the inflows to W1 and W2. These butterfly valves were partially closed to create sufficient back pressure in the main water lines to push water through the connecting pipe and into the billabong inflow pipe. The butterfly valves could also be adjusted to equilibrate inflow between the two experimental wetlands. Because of the turbulence caused by the partial closing of the butterfly valves, extensions were placed on top of the inflow pipestands to assure that probe readings from the YSI data sondes were accurate.

Precipitation (P)

Precipitation was downloaded from the weather station at the ORWRP. Liquid precipitation in the form of snow was not easily accounted for during winter.

Surface Outflow (S_o)

Outflow measurements from the experimental wetlands are based on wetland water level and the status of the control weir boxes constructed at the southern edge of the basins (Zhang and Mitsch, 2001). The three important variables needed are: 1) the water level in the basins; 2) the status of weirs or other control devices in the weir boxes; and 3) the crest elevation of the weir or other control device. These data are then used with weir equations that relate head to rate of outflow. When outflow was blocked with debris, outflow was estimated from equation 1.

Wetland Water Level

From the beginning of the project, water level has been recorded twice-per-day by reading a staff gauge located near the outflow. These data are supplemented with continuous water level Ott Thalimedes data loggers installed in 2001 in W1 and W2.

Weir Box Status

Four different conditions of weir box outflow control have occurred since 1995: v-notch plate in place (V + 0); v-notch and one stoplog in place (V + 1); v-notch and two stoplogs in place (V + 2); and no v-notch or stoplog (noweir). Details of computing outflow with v-notch were given in Wang and Mitsch (1999). Major changes in hydrological pumping and weirs in 2004 are presented in Table 1.

Flow Equations

Normally, rating curves developed from velocity readings in the outflow pipes downstream of the weirs are used to

Table 1. Major changes in hydrological pumping and weirs status in 2005 (non-pulsing year).

Date	Time	Pump Status 1	2	Wier Code
2/1/05	8:10	ON	OFF	no weir
2/1/05	14:09	OFF	OFF	no weir
2/1/05	14:11	ON	OFF	no weir
5/3/05	16:00	OFF	ON	no weir
6/14/05	8:30	ON	ON	no weir
6/14/05	19:00	OFF	ON	no weir
6/21/05	19:00	OFF	OFF	no weir
6/22/05	8:00	OFF	ON	no weir
6/23/05	20:45	OFF	ON	no weir
7/31/05	9:15	On	OFF	no weir
8/2/05	16:35	OFF	OFF	no weir
8/2/05	19:50	ON	OFF	no weir
8/7/05	19:48	OFF	ON	no weir
8/9/05	19:00	ON	OFF	no weir
8/16/05	19:00	OFF	ON	no weir
10/21/05	16:48	Off	ON	no weir
10/23/05	14:50	Off	Off	no weir
10/23/05	14:55	OFF	ON	no weir
10/30/05	9:30	OFF	OFF	no weir
10/30/05	15:40	OFF	ON	no weir
10/31/05	11:05	OFF	OFF	no weir
11/3/05	9:13	OFF	ON	no weir
11/6/05	8:57	ON	ON	no weir
11/6/05	15:15	OFF	ON	no weir
11/13/05	16:45	OFF	ON	no weir
11/28/05	8:40	OFF	OFF	no weir
12/2/05	9:10	ON	ON	no weir
12/5/05	10:00	OFF	ON	no weir

estimate outflow. The empirical equations (no weirs) is:

for W1: $S_o = 0.4(\text{water level} - 0.44)^{3.490}$ (2)

for W2: $S_o = 0.59(\text{water level} - 0.68)^{2.747}$ (3)

where

S_o = outflow, cfs,

Evapotranspiration (ET)

For 2005, evapotranspiration was estimated from the ORW data from 1999.

Seepage to Ground Water (G_o)

Changes in wetland volume during these periods that were not accounted for by precipitation or evapotranspiration could be used to estimate seepage, as follows:

$$G_o = -\Delta V + P - ET \quad (4)$$

Time periods during which the no-inflow/no-outflow criteria were satisfied occurred when pumps were shut down, either for drawdown or for maintenance reasons, and wetland water levels were below the weir.

Change in Volume (ΔV)

Net change in wetland volume over any given period was determined using beginning and ending water levels and the known relationship between water levels and wetland volume.

Results and Discussion

Figure 2 presents calibration of inflow for billabong vs. total pumped inflows to the two experimental wetlands. The inflow for W1 and W2 was calculated with the equation in Fugure 2. Figure 3 shows water levels of both W1 and W2 in 2005. Water levels remained static for the entire year with the exception of flood events in January 11–14 and 18, 2005. The flood added approximately 3.0 m to W1 and 3.0 m to W2, respectively. Figure 4 shows a photo taken W1 in January 13 during the flooding event.

Annual and monthly hydrologic budgets area summarized for 2005 in Table 2. In 2005, total inflows to W1 and W2 were 39 m each. Surface outflow for 2005 was estimated to be 32 m for both W1 and W2. Daily flows on which these budgets were based are attached in Appendix A.

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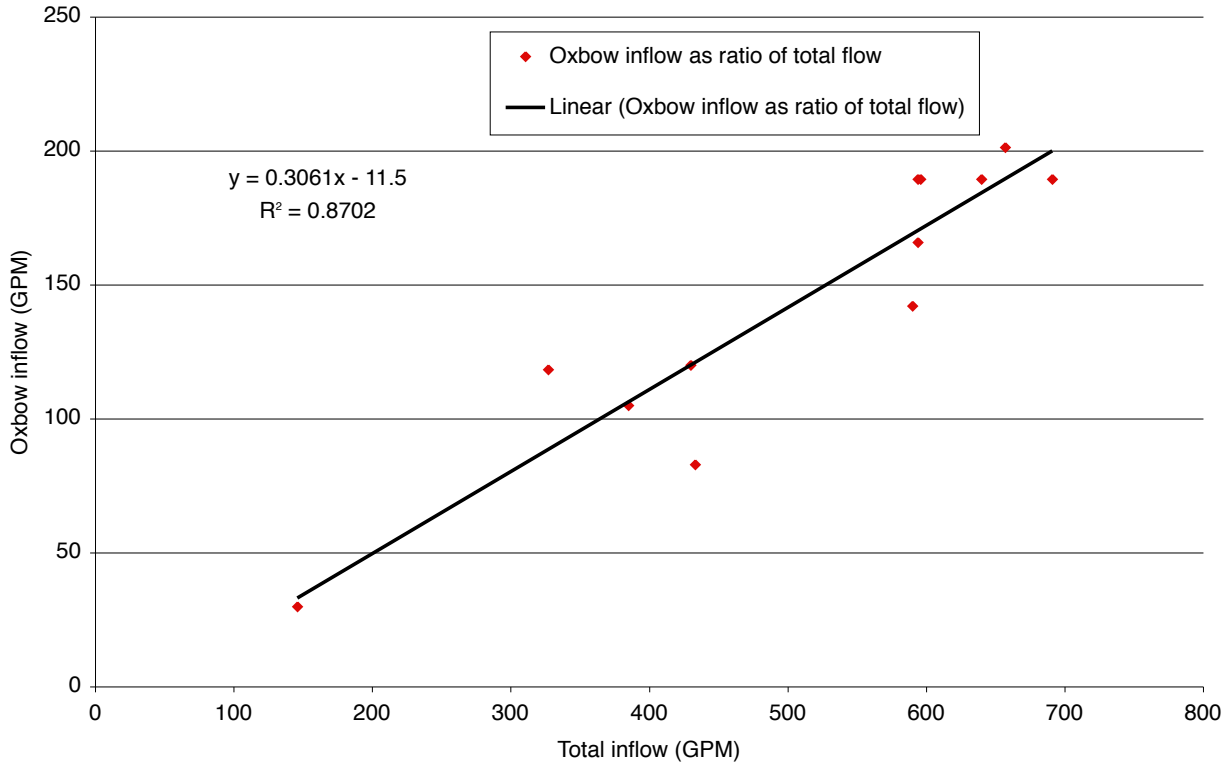

Figure 2. Calibration of inlfow for Billabong vs. continuously measured inflow to Wetlands (W1 and W2) in 2005.

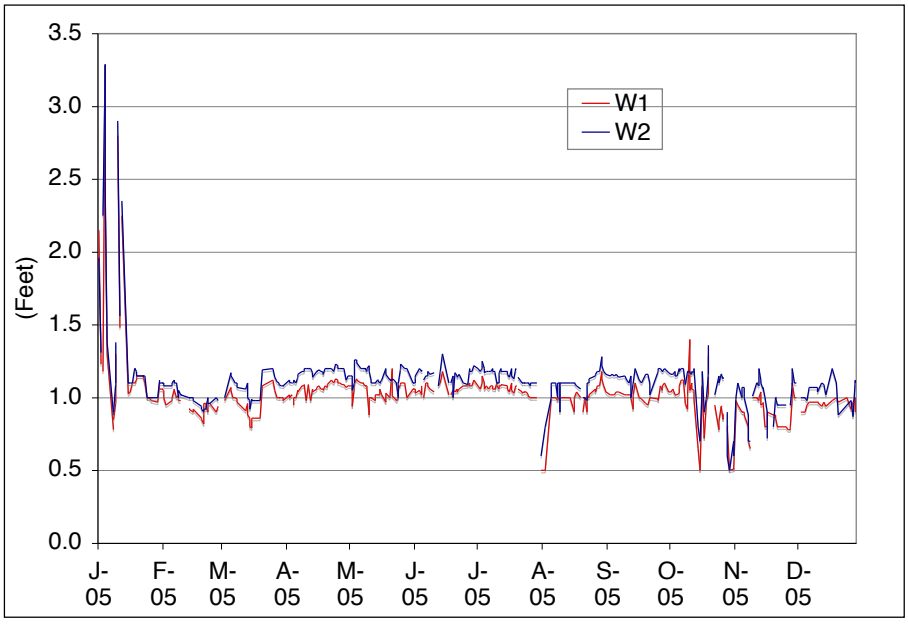

Figure 3. Water level of Wetland 1 and Wetland 2 in 2005.

Table 2. Monthly and annual water budgets of the two Olentangy River experimental wetlands in 2005.

	WET 1							WET 2					
Month	inf.(m)	outf(m)	Precip.	ET	seepg	D vol	Month	inf.(m)	outf.(m)	Precip.	ET	seepg	D vol
Jan	4.7	9.1	0.3	0.0	-4.1	0.0	Jan	4.7	7.2	0.3	0.0	-2.2	0.0
Feb	2.8	1.6	0.1	0.1	1.1	0.0	Feb	2.8	1.6	0.1	0.1	1.2	0.0
Mar	3.2	2.0	0.1	0.1	1.2	0.0	Mar	3.2	2.1	0.1	0.1	1.0	0.0
Apr	2.8	2.5	0.2	0.0	0.4	0.0	Apr	2.8	2.7	0.2	0.0	0.2	0.0
May	3.0	2.6	0.1	0.1	0.4	0.0	May	3.0	2.8	0.1	0.1	0.3	0.0
Jun	3.5	2.6	0.1	0.0	1.0	0.0	Jun	3.5	2.6	0.1	0.0	1.0	0.0
Jul	3.3	2.7	0.1	0.2	0.4	0.1	Jul	3.3	2.7	0.1	0.2	0.5	0.0
Aug	3.3	2.0	0.2	0.1	1.4	-0.1	Aug	3.3	2.1	0.2	0.1	1.2	0.0
Sept	3.6	2.2	0.1	0.1	1.5	0.0	Sept	3.6	2.5	0.1	0.1	1.2	0.0
Oct	3.4	1.9	0.1	0.1	1.5	0.1	Oct	3.4	2.3	0.1	0.1	1.2	-0.1
Nov	2.1	1.2	0.1	0.0	1.0	0.0	Nov	2.1	1.3	0.1	0.0	0.8	0.0
Dec	3.3	1.8	0.0	0.0	1.5	0.1	Dec	3.3	1.8	0.0	0.0	1.6	0.0
Total	39.1	32.1	1.4	0.9	7.4	0.0	Total	39.1	31.8	1.4	0.9	7.8	0.0

Figure 4 Flooding event of W1 in January 13, 2005

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Appendix A. Daily water budgets (cm) of the two Olentangy River experimental wetlands in 2005.

Wetland 1							Wetland 2						
Date	Inf.	Outf.	Precip.	Evap.	Seep	D Vol.	Date	Inf.	Outf.	Precip.	Evap.	Seep.	D Vol.
1/1/05	4.1	4.1	0.2	0.0	0.1	0.0	1/1/05	4.1	4.1	0.2	0.0		0.0
1/2/05	4.1	4.1	0.3	0.0	0.3	0.0	1/2/05	4.1	4.1	0.3	0.0	0.3	0.0
1/3/05	4.1	4.1	5.2	0.0	5.2	0.0	1/3/05	4.1	4.1	5.2	0.0	5.2	0.0
1/4/05	4.1	4.1	0.6	0.0	0.6	0.0	1/4/05	4.1	4.1	0.6	0.0	0.6	0.0
1/5/05	4.1	4.1	7.8	0.0	7.8	0.0	1/5/05	4.1	4.1	7.8	0.0	7.8	0.0
1/6/05	4.1	4.1	2.0	0.1	1.9	0.0	1/6/05	4.1	4.1	2.0	0.1	1.9	0.0
1/7/05	4.1	4.1	0.0	0.1	-0.1	0.0	1/7/05	4.1	4.1	0.0	0.1	-0.1	0.0
1/8/05	4.1	4.1	1.2	0.2	1.0	0.0	1/8/05	4.1	4.1	1.2	0.2	1.0	0.0
1/9/05	4.1	4.1	0.0	0.1	-0.1	0.0	1/9/05	4.1	4.1	0.0	0.2	-0.1	0.0
1/10/05	9.7	9.7	0.0	0.0	-5.6	5.6	1/10/05	9.7	9.7	0.0	0.0	-5.6	5.6
1/11/05	10.8	10.8	7.5	0.1	7.6	1.1	1/11/05	10.8	10.2	7.5	0.1	7.6	0.5
1/12/05	65.8	63.0	0.1	0.1	-49.4	52.1	1/12/05	65.8	63.0	0.1	0.1	-50.0	52.8
1/13/05	65.8	38.9	2.2	0.2	52.9	-24.1	1/13/05	65.8	38.9	2.2	0.2	52.9	-24.1
1/14/05	65.8	108.8	0.0	0.2	-113.2	70.0	1/14/05	65.8	108.8	0.0	0.2	-113.2	70.0
1/15/05	65.8	55.4	0.0	0.2	63.5	-53.4	1/15/05	65.8	55.4	0.0	0.2	63.5	-53.4
1/16/05	5.5	24.1	0.0	0.1	12.7	-31.4	1/16/05	5.5	24.1	0.0	0.1	12.7	-31.4
1/17/05	8.3	8.6	0.0	0.1	16.0	-15.9	1/17/05	8.3	8.6	0.0	0.1	15.0	-15.4
1/18/05	80.0	17.7	0.0	0.2	61.6	5.0	1/18/05	80.0	17.7	0.0	0.2	53.1	9.0
1/19/05	16.3	108.0	0.0	0.2	-42.8	22.8	1/19/05	16.3	108.0	0.0	0.2	-182.2	90.3
1/20/05	14.7	20.6	0.0	0.1	9.3	-15.4	1/20/05	14.7	30.1	0.0	0.1	62.4	-77.9
1/21/05	12.4	10.5	0.0	0.2	11.8	-10.1	1/21/05	12.4	9.4	0.0	0.2	23.5	-20.7
1/22/05	10.4	11.6	0.0	0.2	-2.4	1.1	1/22/05	10.4	8.6	0.0	0.2	2.5	-0.8
1/23/05	10.4	11.6	0.0	0.0	-1.2	0.0	1/23/05	10.4	8.6	0.0	0.0	1.8	0.0
1/24/05	10.4	10.9	0.0	0.1	0.2	-0.7	1/24/05	10.4	8.1	0.0	0.1	2.8	-0.5
1/25/05	9.3	9.4	1.3	0.0	2.6	-1.5	1/25/05	9.3	7.1	1.3	0.0	4.5	-1.0
1/26/05	8.1	7.2	0.0	0.1	3.1	-2.2	1/26/05	8.1	5.5	0.0	0.1	4.1	-1.6
1/27/05	7.7	6.8	0.0	0.1	1.3	-0.4	1/27/05	7.7	5.2	0.0	0.1	2.7	-0.3
1/28/05	5.8	6.3	0.0	0.0	-0.2	-0.4	1/28/05	5.8	5.2	0.0	0.0	0.6	0.0
1/29/05	5.8	6.2	0.0	0.1	-0.4	-0.1	1/29/05	5.8	5.2	0.0	0.2	0.5	0.0
1/30/05	5.8	6.1	0.9	0.2	0.4	-0.1	1/30/05	5.8	5.2	0.9	0.2	1.3	0.0
1/31/05	12.4	6.1	0.0	0.2	6.1	0.0	1/31/05	12.4	5.3	0.0	0.2	6.9	0.1
2/1/05	14.7	8.9	0.0	0.1	3.0	2.7	2/1/05	14.7	7.3	0.0	0.1	5.3	2.0
2/2/05	12.8	8.5	0.0	0.4	4.3	-0.4	2/2/05	12.8	7.3	0.0	0.4	5.0	0.0
2/3/05	12.4	7.7	0.2	0.2	5.6	-0.8	2/3/05	12.4	7.1	0.2	0.2	5.4	-0.2
2/4/05	10.7	5.8	0.0	0.0	6.7	-1.9	2/4/05	10.7	6.8	0.0	0.1	4.1	-0.3
2/5/05	10.4	5.8	0.0	0.1	4.5	0.0	2/5/05	10.4	6.8	0.0	0.1	3.5	0.0
2/6/05	10.4	6.0	0.0	0.4	3.7	0.2	2/6/05	10.4	6.8	0.0	0.4	3.2	0.0
2/7/05	10.0	6.5	0.5	0.6	3.0	0.4	2/7/05	10.0	7.0	0.5	0.6	2.7	0.2
2/8/05	10.0	8.1	1.0	0.5	0.8	1.6	2/8/05	10.0	7.5	1.0	0.5	2.4	0.5
2/9/05	10.0	7.2	0.1	0.5	3.3	-0.9	2/9/05	10.0	7.2	0.1	0.5	2.7	-0.3
2/10/05	9.1	6.7	0.0	0.4	2.6	-0.5	2/10/05	9.1	5.8	0.0	0.4	4.4	-1.4
2/11/05	10.1	6.3	0.0	0.1	4.2	-0.5	2/11/05	10.1	5.7	0.0	0.1	4.5	-0.1
2/12/05	10.2	6.0	0.0	0.1	4.4	-0.3	2/12/05	10.2	5.5	0.0	0.1	4.8	-0.2
2/13/05	9.9	5.6	0.1	0.3	4.4	-0.4	2/13/05	9.9	5.4	0.1	0.3	4.3	-0.1
2/14/05	9.6	5.2	0.9	0.5	5.1	-0.4	2/14/05	9.6	5.3	0.9	0.5	4.7	-0.1
2/15/05	9.3	4.9	0.0	0.5	4.2	-0.3	2/15/05	9.3	5.2	0.0	0.5	3.7	-0.1
2/16/05	9.3	4.7	0.3	0.1	4.9	-0.2	2/16/05	9.3	5.2	0.3	0.1	4.3	0.0
2/17/05	8.6	4.7	0.1	0.1	4.1	-0.1	2/17/05	8.6	5.0	0.1	0.1	3.8	-0.1
2/18/05	7.3	4.7	0.0	0.0	2.6	0.0	2/18/05	7.3	4.7	0.0	0.0	2.9	-0.4
2/19/05	6.8	4.3	0.0	0.1	2.7	-0.3	2/19/05	6.8	4.5	0.0	0.1	2.4	-0.2
2/20/05	7.3	4.7	0.7	0.1	2.7	0.4	2/20/05	7.3	5.0	0.7	0.1	2.3	0.5
2/21/05	5.8	3.7	0.0	0.2	2.9	-1.0	2/21/05	5.8	4.0	0.0	0.2	2.6	-1.0
2/22/05	9.4	4.2	0.0	0.4	4.3	0.5	2/22/05	9.4	3.7	0.0	0.4	5.7	-0.3
2/23/05	14.2	5.7	0.0	0.1	6.8	1.5	2/23/05	14.2	3.8	0.0	0.1	10.1	0.2
2/24/05	10.8	5.1	0.3	0.2	6.3	-0.6	2/24/05	10.8	4.7	0.3	0.2	5.3	0.9
2/25/05	10.4	5.6	0.0	0.6	3.9	0.4	2/25/05	10.4	4.6	0.0	0.6	5.4	-0.1

Wetland 1							Wetland 2						
Date	Inf.	Outf.	Precip.	Evap.	Seep	D Vol.	Date	Inf.	Outf.	Precip.	Evap.	Seep.	D Vol.
2/26/05	10.2	4.7	0.0	0.4	6.0	-0.9	2/26/05	10.2	5.1	0.0	0.4	4.1	0.5
2/27/05	9.8	4.9	0.0	0.5	4.1	0.3	2/27/05	9.8	5.0	0.0	0.5	4.5	-0.1
2/28/05	9.4	5.2	1.7	0.3	5.2	0.3	2/28/05	9.4	4.9	1.7	0.3	6.0	-0.1
3/1/05	8.4	5.3	0.0	0.3	2.6	0.1	3/1/05	8.4	4.8	0.0	0.3	3.3	0.0
3/2/05	9.9	5.4	0.0	0.3	4.0	0.1	3/2/05	9.9	5.0	0.0	0.3	4.4	0.2
3/3/05	14.9	6.6	0.1	0.1	7.1	1.2	3/3/05	14.9	6.9	0.1	0.1	6.0	2.0
3/4/05	15.1	6.4	0.0	0.2	8.6	-0.1	3/4/05	15.1	5.8	0.0	0.2	10.2	-1.1
3/5/05	14.3	7.8	0.5	0.3	5.3	1.4	3/5/05	14.3	7.6	0.5	0.3	5.2	1.8
3/6/05	8.4	5.3	0.0	0.4	5.2	-2.5	3/6/05	8.4	4.8	0.0	0.4	5.9	-2.7
3/7/05	13.6	8.4	0.2	0.4	1.8	3.1	3/7/05	13.6	8.7	0.2	0.4	0.8	3.9
3/8/05	12.6	7.0	0.0	0.1	6.9	-1.4	3/8/05	12.6	8.1	0.0	0.1	5.1	-0.6
3/9/05	11.8	6.8	0.0	0.1	5.2	-0.3	3/9/05	11.8	7.5	0.0	0.1	4.8	-0.6
3/10/05	10.6	6.4	0.0	0.3	4.3	-0.4	3/10/05	10.6	7.1	0.0	0.3	3.7	-0.4
3/11/05	10.7	5.7	0.0	0.4	5.2	-0.6	3/11/05	10.7	6.6	0.0	0.4	4.2	-0.5
3/12/05	11.0	5.3	0.2	0.3	6.0	-0.4	3/12/05	11.0	6.5	0.2	0.3	4.5	-0.1
3/13/05	11.4	4.9	0.0	0.4	6.5	-0.4	3/13/05	11.4	6.4	0.0	0.4	4.6	-0.1
3/14/05	10.1	4.2	0.0	0.4	6.1	-0.7	3/14/05	10.1	5.6	0.0	0.5	4.9	-0.9
3/15/05	4.7	4.8	0.0	0.4	-1.2	0.6	3/15/05	4.7	6.1	0.0	0.5	-2.5	0.6
3/16/05	9.3	3.5	0.0	0.5	6.7	-1.3	3/16/05	9.3	4.5	0.0	0.5	5.8	-1.6
3/17/05	9.3	3.1	0.0	0.1	6.5	-0.4	3/17/05	9.3	4.7	0.0	0.1	4.3	0.2
3/18/05	9.3	3.8	0.0	0.1	4.7	0.7	3/18/05	9.3	4.8	0.0	0.2	4.2	0.1
3/19/05	9.3	3.8	1.1	0.3	6.3	0.0	3/19/05	9.3	4.8	1.1	0.3	5.3	0.0
3/20/05	9.3	3.8	0.0	0.1	5.4	0.0	3/20/05	9.3	4.8	0.0	0.1	4.4	0.0
3/21/05	9.3	4.4	0.0	0.1	4.0	0.7	3/21/05	9.3	5.5	0.0	0.1	3.0	0.7
3/22/05	9.3	8.5	0.2	0.3	-3.5	4.1	3/22/05	9.3	9.1	0.2	0.3	-3.7	3.7
3/23/05	9.3	9.4	1.6	0.4	0.2	0.9	3/23/05	9.3	9.7	1.6	0.4	0.2	0.6
3/24/05	9.3	9.7	0.0	0.5	-1.1	0.3	3/24/05	9.3	9.8	0.0	0.5	-1.0	0.1
3/25/05	9.3	9.9	1.7	0.3	0.4	0.3	3/25/05	9.3	9.8	1.7	0.3	0.7	0.1
3/26/05	9.3	10.2	0.1	0.6	-1.8	0.3	3/26/05	9.3	9.9	0.1	0.6	-1.2	0.1
3/27/05	9.7	9.9	0.0	0.5	-0.4	-0.3	3/27/05	9.7	9.5	0.0	0.6	0.0	-0.4
3/28/05	11.6	7.8	4.3	0.3	9.7	-2.1	3/28/05	11.6	8.1	4.3	0.3	8.8	-1.4
3/29/05	12.6	7.0	0.0	0.4	6.1	-0.8	3/29/05	12.6	7.7	0.0	0.4	5.0	-0.4
3/30/05	13.0	6.8	0.0	0.4	6.0	-0.2	3/30/05	13.0	7.3	0.0	0.4	5.7	-0.4
3/31/05	13.0	6.8	0.0	0.4	5.8	0.0	3/31/05	13.0	6.9	0.0	0.4	6.0	-0.3
4/1/05	9.3	6.6	0.9	0.1	3.7	-0.2	4/1/05	9.3	6.9	0.9	0.1	3.3	-0.1
4/2/05	8.4	6.5	2.9	0.1	4.8	-0.1	4/2/05	8.4	7.1	2.9	0.1	3.9	0.2
4/3/05	7.6	6.9	0.0	0.1	0.2	0.4	4/3/05	7.6	7.5	0.0	0.1	-0.3	0.4
4/4/05	8.2	7.1	0.0	0.1	0.8	0.2	4/4/05	8.2	7.6	0.0	0.1	0.3	0.2
4/5/05	9.1	7.0	0.0	0.2	2.0	-0.1	4/5/05	9.1	7.3	0.0	0.2	1.8	-0.3
4/6/05	9.6	6.1	0.0	0.2	4.2	-0.9	4/6/05	9.6	7.5	0.0	0.2	1.8	0.1
4/7/05	9.1	6.8	0.6	0.1	2.2	0.7	4/7/05	9.1	7.5	0.6	0.1	2.1	0.0
4/8/05	6.8	7.8	0.0	0.1	-2.2	1.0	4/8/05	6.8	8.3	0.0	0.1	-2.5	0.8
4/9/05	7.5	8.4	0.0	0.1	-1.5	0.5	4/9/05	7.5	9.0	0.0	0.1	-2.3	0.7
4/10/05	9.2	9.0	0.0	0.2	-0.6	0.7	4/10/05	9.2	9.3	0.0	0.2	-0.6	0.3
4/11/05	11.0	9.2	0.0	0.2	1.5	0.1	4/11/05	11.0	9.6	0.0	0.2	1.0	0.2
4/12/05	9.3	7.2	0.0	0.2	3.9	-2.0	4/12/05	9.3	9.9	0.0	0.2	-1.2	0.4
4/13/05	10.4	9.0	0.2	0.1	-0.2	1.8	4/13/05	10.4	9.9	0.2	0.1	0.6	0.0
4/14/05	10.0	7.3	0.0	0.1	4.2	-1.7	4/14/05	10.0	9.9	0.0	0.1	0.0	0.0
4/15/05	8.4	7.9	0.0	0.1	-0.2	0.6	4/15/05	8.4	9.0	0.0	0.1	0.3	-0.9
4/16/05	8.1	8.1	0.0	0.1	-0.3	0.2	4/16/05	8.1	8.7	0.0	0.1	-0.4	-0.3
4/17/05	9.3	8.6	0.0	0.2	0.2	0.5	4/17/05	9.3	9.3	0.0	0.2	-0.7	0.6
4/18/05	9.9	9.0	0.3	0.1	0.7	0.4	4/18/05	9.9	9.5	0.3	0.1	0.3	0.3
4/19/05	9.9	8.7	0.0	0.0	1.4	-0.3	4/19/05	9.9	9.5	0.0	0.0	0.4	-0.1
4/20/05	9.3	8.4	2.0	0.2	3.0	-0.3	4/20/05	9.3	9.1	2.0	0.2	2.3	-0.3
4/21/05	10.5	8.9	0.2	0.1	1.2	0.5	4/21/05	10.5	9.8	0.2	0.1	0.2	0.6
4/22/05	9.9	9.1	2.4	0.1	3.0	0.1	4/22/05	9.9	9.9	2.4	0.1	2.1	0.2
4/23/05	8.6	9.9	3.6	0.2	1.4	0.8	4/23/05	8.6	9.9	3.6	0.2	2.1	0.0
4/24/05	9.6	10.3	1.4	0.2	0.0	0.5	4/24/05	9.6	9.9	1.4	0.2	1.0	-0.1
4/25/05	10.6	10.0	0.0	0.1	0.9	-0.4	4/25/05	10.6	9.5	0.0	0.1	1.3	-0.3

Wetland 1 Date	Inf.	Outf.	Precip.	Evap.	Seep	D Vol.	Wetland 2 Date	Inf.	Outf.	Precip.	Evap.	Seep.	D Vol.
4/26/05	10.5	10.4	1.6	0.1	1.2	0.4	4/26/05	10.5	10.2	1.6	0.1	1.2	0.7
4/27/05	9.7	10.3	0.0	0.2	-0.7	-0.1	4/27/05	9.7	10.3	0.0	0.2	-1.0	0.1
4/28/05	9.5	9.7	0.0	0.2	0.2	-0.5	4/28/05	9.5	9.9	0.0	0.2	-0.1	-0.4
4/29/05	9.7	9.5	0.2	0.2	0.4	-0.2	4/29/05	9.7	9.9	0.2	0.2	-0.2	0.0
4/30/05	9.8	9.4	0.2	0.1	0.6	-0.1	4/30/05	9.8	9.7	0.2	0.1	0.4	-0.2
5/1/05	10.3	9.0	0.0	0.0	1.8	-0.4	5/1/05	10.3	8.3	0.0	0.0	3.4	-1.4
5/2/05	11.0	9.0	0.0	0.2	1.8	0.0	5/2/05	11.0	8.2	0.0	0.2	2.7	-0.1
5/3/05	13.0	9.1	0.0	0.1	3.6	0.1	5/3/05	13.0	8.6	0.0	0.1	4.0	0.3
5/4/05	8.3	7.7	0.0	0.0	2.0	-1.4	5/4/05	8.3	7.6	0.0	0.0	1.5	-0.9
5/5/05	7.2	8.7	0.0	0.0	-2.6	1.0	5/5/05	7.2	8.6	0.0	0.0	-2.4	0.9
5/6/05	11.3	10.5	0.0	0.0	-1.0	1.8	5/6/05	11.3	11.5	0.0	0.0	-3.1	2.9
5/7/05	10.7	10.2	0.1	0.1	0.8	-0.3	5/7/05	10.7	10.7	0.1	0.1	0.9	-0.9
5/8/05	10.7	18.3	0.0	0.0	-15.8	8.1	5/8/05	10.7	18.8	0.0	0.0	-16.4	8.2
5/9/05	11.4	9.8	0.0	0.1	10.1	-8.5	5/9/05	11.4	9.9	0.0	0.1	10.3	-8.9
5/10/05	11.3	9.3	0.1	0.0	2.5	-0.4	5/10/05	11.3	9.9	0.1	0.0	1.5	0.0
5/11/05	10.0	8.8	1.1	0.1	2.9	-0.6	5/11/05	10.0	9.7	1.1	0.1	1.7	-0.2
5/12/05	10.1	5.6	0.0	0.2	7.5	-3.2	5/12/05	10.1	10.0	0.0	0.2	-0.3	0.3
5/13/05	9.9	6.8	0.1	1.4	0.6	1.2	5/13/05	9.9	7.9	0.1	1.4	2.8	-2.1
5/14/05	9.2	6.6	2.8	0.0	5.7	-0.2	5/14/05	9.2	7.3	2.8	0.0	5.3	-0.6
5/15/05	9.2	6.7	0.0	0.0	2.3	0.1	5/15/05	9.2	7.3	0.0	0.0	1.8	0.0
5/16/05	8.9	7.3	0.0	0.1	0.9	0.6	5/16/05	8.9	7.7	0.0	0.1	0.7	0.4
5/17/05	8.6	7.5	0.0	0.3	0.5	0.2	5/17/05	8.6	7.5	0.0	0.3	1.0	-0.3
5/18/05	9.2	7.7	0.0	0.0	1.3	0.2	5/18/05	9.2	7.6	0.0	0.0	1.4	0.2
5/19/05	9.4	6.8	5.1	0.0	8.8	-1.0	5/19/05	9.4	8.6	5.1	0.0	4.9	1.0
5/20/05	9.0	6.7	0.0	0.0	2.5	-0.1	5/20/05	9.0	9.4	0.0	0.0	-1.0	0.7
5/21/05	8.6	7.2	0.0	0.0	0.7	0.6	5/21/05	8.6	8.4	0.0	0.0	1.1	-1.0
5/22/05	8.8	7.1	0.2	0.0	2.1	-0.2	5/22/05	8.8	7.9	0.2	0.0	1.6	-0.5
5/23/05	8.1	10.4	0.1	2.3	-7.8	3.3	5/23/05	8.1	7.9	0.1	2.3	-2.0	0.0
5/24/05	7.8	6.8	0.0	0.0	4.6	-3.6	5/24/05	7.8	7.9	0.0	0.0	0.0	0.0
5/25/05	8.1	6.3	0.0	0.1	2.2	-0.5	5/25/05	8.1	7.3	0.0	0.1	1.2	-0.5
5/26/05	8.9	7.3	0.0	0.2	0.4	1.0	5/26/05	8.9	6.3	0.0	0.2	3.4	-1.0
5/27/05	11.9	9.4	0.1	0.1	0.5	2.1	5/27/05	11.9	9.7	0.1	0.1	-1.2	3.4
5/28/05	12.2	9.8	0.7	0.3	2.4	0.4	5/28/05	12.2	10.5	0.7	0.3	1.4	0.7
5/29/05	12.1	9.4	0.0	0.1	2.9	-0.3	5/29/05	12.1	10.0	0.0	0.1	2.5	-0.5
5/30/05	11.9	7.6	0.4	0.1	6.6	-1.9	5/30/05	11.9	9.9	0.4	0.1	2.4	-0.1
5/31/05	11.9	7.8	0.0	0.5	3.3	0.3	5/31/05	11.9	8.2	0.0	0.5	4.8	-1.7
6/1/05	11.9	7.8	0.0	0.0	4.0	0.0	6/1/05	11.9	8.2	0.0	0.0	3.6	0.0
6/2/05	12.1	8.4	0.1	0.1	3.1	0.6	6/2/05	12.1	7.4	0.1	0.1	5.5	-0.8
6/3/05	11.1	8.2	0.0	0.0	3.2	-0.2	6/3/05	11.1	7.7	0.0	0.0	3.0	0.3
6/4/05	10.4	7.8	0.0	0.2	2.7	-0.4	6/4/05	10.4	9.0	0.0	0.2	-0.2	1.3
6/5/05	10.6	8.5	0.0	0.1	1.3	0.7	6/5/05	10.6	9.7	0.0	0.1	0.0	0.7
6/6/05	10.6	9.8	0.0	0.2	-0.7	1.4	6/6/05	10.6	9.5	0.0	0.2	1.2	-0.2
6/7/05	12.6	8.4	0.0	0.1	5.6	-1.5	6/7/05	12.6	9.0	0.0	0.1	3.9	-0.5
6/8/05	13.1	8.5	0.4	0.2	4.6	0.1	6/8/05	13.1	8.2	0.4	0.2	5.8	-0.8
6/9/05	12.6	9.6	0.0	0.2	1.8	1.1	6/9/05	12.6	8.8	0.0	0.2	3.1	0.6
6/10/05	11.7	8.6	0.2	0.2	4.2	-1.0	6/10/05	11.7	8.9	0.2	0.2	2.7	0.1
6/11/05	11.6	8.2	0.1	0.2	3.6	-0.4	6/11/05	11.6	9.0	0.1	0.2	2.5	0.0
6/12/05	10.3	7.9	0.1	0.2	2.4	-0.3	6/12/05	10.3	9.1	0.1	0.2	0.9	0.1
6/13/05	4.6	7.9	0.0	0.3	-3.5	0.0	6/13/05	4.6	9.1	0.0	0.3	-4.8	0.0
6/14/05	11.9	8.3	0.0	0.0	3.2	0.4	6/14/05	11.9	8.3	0.0	0.0	4.3	-0.8
6/15/05	14.9	10.1	0.0	0.0	3.0	1.8	6/15/05	14.9	9.4	0.0	0.0	4.4	1.1
6/16/05	15.2	12.2	0.0	0.1	0.8	2.1	6/16/05	15.2	12.3	0.0	0.1	-0.2	2.9
6/17/05	13.4	10.7	0.0	0.0	4.2	-1.5	6/17/05	13.4	10.9	0.0	0.0	4.0	-1.5
6/18/05	11.3	8.9	0.0	0.1	4.1	-1.8	6/18/05	11.3	9.0	0.0	0.1	4.1	-1.9
6/19/05	9.5	7.5	0.0	0.1	3.3	-1.4	6/19/05	9.5	8.0	0.0	0.1	2.3	-1.0
6/20/05	10.8	7.3	0.0	0.2	3.4	-0.2	6/20/05	10.8	9.0	0.0	0.2	0.6	1.0
6/21/05	13.5	8.0	0.0	0.5	4.4	0.7	6/21/05	13.5	8.1	0.0	0.5	5.8	-0.9
6/22/05	12.6	8.0	0.0	0.6	3.9	0.0	6/22/05	12.6	8.9	0.0	0.6	2.2	0.8
6/23/05	12.2	8.2	0.0	0.0	3.7	0.2	6/23/05	12.2	8.5	0.0	0.0	4.0	-0.4
6/24/05	12.3	8.4	0.0	0.0	3.8	0.2	6/24/05	12.3	8.6	0.0	0.0	3.7	0.1

Date	Inf.	Outf.	Precip.	Evap.	Seep	D Vol.	Date	Inf.	Outf.	Precip.	Evap.	Seep.	D Vol.
6/25/05	11.7	8.8	1.7	0.0	4.1	0.4	6/25/05	11.7	8.0	1.7	0.0	5.9	-0.6
6/26/05	11.3	9.1	0.0	0.1	1.8	0.3	6/26/05	11.3	7.4	0.0	0.1	4.5	-0.7
6/27/05	11.7	9.1	0.9	0.1	3.4	0.0	6/27/05	11.7	7.2	0.9	0.1	5.5	-0.2
6/28/05	12.2	9.2	3.3	0.0	6.2	0.1	6/28/05	12.2	7.5	3.3	0.0	7.7	0.3
6/29/05	11.8	9.5	0.0	0.0	2.0	0.3	6/29/05	11.8	9.5	0.0	0.0	0.3	2.0
6/30/05	15.3	9.3	4.7	0.1	10.9	-0.2	6/30/05	15.3	9.5	4.7	0.1	10.4	0.0
7/1/05	13.1	10.2	0.5	0.5	2.0	0.9	7/1/05	13.1	10.3	0.5	0.5	2.0	0.8
7/2/05	12.4	9.8	0.0	0.7	2.4	-0.5	7/2/05	12.4	10.2	0.0	0.7	1.6	-0.1
7/3/05	12.4	9.0	0.0	0.7	3.4	-0.7	7/3/05	12.4	9.8	0.0	0.7	2.3	-0.4
7/4/05	13.1	8.9	0.0	0.6	3.8	-0.1	7/4/05	13.1	9.5	0.0	0.7	3.2	-0.3
7/5/05	11.9	10.3	3.3	1.0	2.5	1.4	7/5/05	11.9	10.4	3.3	1.0	3.0	0.8
7/6/05	11.0	9.6	0.0	0.6	1.4	-0.6	7/6/05	11.0	9.9	0.0	0.6	1.0	-0.5
7/7/05	11.0	9.0	0.0	0.4	2.2	-0.6	7/7/05	11.0	9.3	0.0	0.4	1.8	-0.6
7/8/05	10.0	9.1	0.2	0.8	0.2	0.1	7/8/05	10.0	9.4	0.2	0.8	0.0	0.1
7/9/05	9.4	9.1	0.0	0.9	-0.5	0.0	7/9/05	9.4	9.4	0.0	0.9	-1.0	0.1
7/10/05	11.7	8.9	0.0	0.8	2.3	-0.2	7/10/05	11.7	9.7	0.0	0.8	1.0	0.3
7/11/05	10.3	8.5	0.0	0.7	1.4	-0.4	7/11/05	10.3	9.2	0.0	0.8	0.7	-0.5
7/12/05	10.7	9.3	0.2	0.7	0.0	0.8	7/12/05	10.7	7.6	0.2	0.7	4.2	-1.6
7/13/05	11.8	8.8	1.4	0.6	4.2	-0.5	7/13/05	11.8	7.9	1.4	0.6	4.3	0.3
7/14/05	11.2	9.2	0.1	0.3	1.3	0.4	7/14/05	11.2	9.6	0.1	0.3	-0.2	1.7
7/15/05	11.1	9.4	0.0	0.7	0.9	0.1	7/15/05	11.1	9.4	0.0	0.7	1.2	-0.2
7/16/05	11.1	9.2	2.0	1.4	2.6	-0.1	7/16/05	11.1	9.4	2.0	1.4	2.3	0.0
7/17/05	11.1	8.9	0.0	1.3	1.3	-0.4	7/17/05	11.1	9.1	0.0	1.3	0.9	-0.2
7/18/05	10.6	8.3	0.3	1.0	2.2	-0.6	7/18/05	10.6	8.6	0.3	1.0	1.8	-0.5
7/19/05	10.1	9.1	0.0	1.0	-0.7	0.8	7/19/05	10.1	9.3	0.0	1.0	-0.8	0.7
7/20/05	10.2	7.8	0.0	0.7	2.8	-1.2	7/20/05	10.2	8.3	0.0	0.7	2.2	-1.1
7/21/05	10.1	8.8	0.2	0.7	-0.2	1.0	7/21/05	10.1	9.4	0.2	0.7	-1.0	1.2
7/22/05	11.7	8.6	0.0	0.7	2.5	-0.2	7/22/05	11.7	8.6	0.0	0.7	3.2	-0.8
7/23/05	11.5	8.2	0.0	0.5	3.2	-0.5	7/23/05	11.5	7.8	0.0	0.5	4.0	-0.8
7/24/05	10.7	7.8	0.0	0.9	2.4	-0.4	7/24/05	10.7	7.3	0.0	0.9	2.9	-0.4
7/25/05	9.9	7.8	0.3	0.6	1.8	0.0	7/25/05	9.9	7.3	0.3	0.6	2.4	0.0
7/26/05	9.3	7.9	0.0	0.5	0.9	0.0	7/26/05	9.3	7.3	0.0	0.5	1.5	0.0
7/27/05	10.9	7.3	0.6	0.6	4.2	-0.6	7/27/05	10.9	7.3	0.6	0.6	3.7	0.0
7/28/05	10.4	6.8	0.0	0.6	3.5	-0.5	7/28/05	10.4	7.1	0.0	0.6	3.0	-0.2
7/29/05	10.4	6.8	0.0	0.5	3.2	-0.1	7/29/05	10.4	7.3	0.0	0.5	2.4	0.2
7/30/05	10.8	6.8	0.0	0.5	3.5	0.0	7/30/05	10.8	7.3	0.0	0.5	3.0	0.0
7/31/05	10.3	6.8	0.0	0.5	3.0	0.0	7/31/05	10.3	7.3	0.0	0.5	2.5	0.0
8/1/05	5.9	6.8	0.0	0.4	-1.3	0.0	8/1/05	5.9	7.3	0.0	0.4	-1.8	0.0
8/2/05	1.6	5.7	0.0	0.3	-3.4	-1.1	8/2/05	1.6	6.2	0.0	0.3	-3.8	-1.1
8/3/05	0.0	0.4	0.0	0.2	4.7	-5.3	8/3/05	0.0	1.0	0.0	0.2	3.9	-5.2
8/4/05	0.4	0.4	0.0	0.2	-0.2	0.0	8/4/05	0.4	1.9	0.0	0.2	-2.5	0.9
8/5/05	3.7	1.2	1.4	0.2	3.0	0.7	8/5/05	3.7	2.9	1.4	0.2	1.0	1.0
8/6/05	8.4	3.3	0.0	0.4	2.5	2.2	8/6/05	8.4	4.0	0.0	0.4	2.8	1.1
8/7/05	12.7	6.4	0.0	0.4	2.8	3.1	8/7/05	12.7	5.8	0.0	0.4	4.7	1.8
8/8/05	13.3	6.8	0.0	0.3	6.0	0.4	8/8/05	13.3	7.3	0.0	0.3	4.3	1.5
8/9/05	12.5	6.8	0.0	0.3	5.5	0.0	8/9/05	12.5	7.3	0.0	0.3	5.0	0.0
8/10/05	12.1	6.5	0.0	0.4	5.4	-0.2	8/10/05	12.1	6.3	0.0	0.5	6.4	-1.0
8/11/05	12.2	6.5	0.0	0.4	5.2	0.0	8/11/05	12.2	7.0	0.0	0.4	4.0	0.7
8/12/05	13.0	6.8	0.0	0.7	5.3	0.2	8/12/05	13.0	7.0	0.0	0.7	5.3	0.0
8/13/05	13.4	6.8	1.1	0.5	7.3	0.0	8/13/05	13.4	7.3	1.1	0.5	6.5	0.3
8/14/05	13.4	6.8	0.0	0.6	6.1	0.0	8/14/05	13.4	7.3	0.0	0.6	5.5	0.0
8/15/05	13.4	6.8	0.4	0.3	6.7	0.0	8/15/05	13.4	7.3	0.4	0.3	6.2	0.0
8/16/05	13.4	6.8	0.1	0.5	6.2	0.0	8/16/05	13.4	7.3	0.1	0.5	5.7	0.0
8/17/05	14.0	6.6	0.0	0.8	6.8	-0.2	8/17/05	14.0	7.3	0.0	0.8	5.9	0.0
8/18/05	7.9	6.5	0.1	1.2	0.4	-0.1	8/18/05	7.9	7.3	0.1	1.2	-0.4	0.0
8/19/05	7.9	7.6	0.0	0.8	-1.6	1.1	8/19/05	7.9	6.9	0.0	0.8	0.6	-0.4
8/20/05	13.0	7.4	1.4	0.7	6.6	-0.2	8/20/05	13.0	6.7	1.4	0.7	7.4	-0.2
8/21/05	13.1	6.9	0.0	0.6	6.0	-0.4	8/21/05	13.1	6.5	0.0	0.6	6.2	-0.2
8/22/05	14.4	5.9	0.0	0.3	9.2	-1.0	8/22/05	14.4	6.0	0.0	0.3	8.7	-0.5

Date	Inf.	Outf.	Precip.	Evap.	Seep	D Vol.	Date	Inf.	Outf.	Precip.	Evap.	Seep.	D Vol.
8/23/05	12.8	5.8	0.0	0.2	6.8	-0.1	8/23/05	12.8	5.2	0.0	0.3	8.1	-0.8
8/24/05	11.9	5.7	0.0	0.2	6.1	-0.1	8/24/05	11.9	5.7	0.0	0.2	5.5	0.5
8/25/05	12.9	7.0	0.0	0.2	4.3	1.3	8/25/05	12.9	7.6	0.0	0.2	3.2	1.9
8/26/05	14.3	7.6	0.1	0.3	5.8	0.6	8/26/05	14.3	8.2	0.1	0.3	5.3	0.6
8/27/05	14.9	8.1	1.2	0.3	7.3	0.4	8/27/05	14.9	8.4	1.2	0.3	7.2	0.2
8/28/05	15.7	8.3	0.0	0.3	6.9	0.2	8/28/05	15.7	8.6	0.0	0.3	6.5	0.3
8/29/05	15.1	8.9	2.2	0.3	7.4	0.7	8/29/05	15.1	9.3	2.2	0.3	7.1	0.6
8/30/05	13.4	9.6	7.1	0.3	10.0	0.6	8/30/05	13.4	9.7	7.1	0.3	10.0	0.5
8/31/05	9.5	11.6	2.0	0.3	-2.3	2.0	8/31/05	9.5	11.3	2.0	0.3	-1.6	1.6
9/1/05	11.4	9.7	0.0	0.1	3.4	-1.9	9/1/05	11.4	9.8	0.0	0.1	3.0	-1.5
9/2/05	12.9	8.1	0.0	0.4	6.0	-1.6	9/2/05	12.9	8.9	0.0	0.4	4.4	-0.9
9/3/05	13.4	7.6	0.0	0.1	6.2	-0.5	9/3/05	13.4	8.7	0.0	0.1	4.8	-0.2
9/4/05	13.8	7.3	0.0	0.1	6.6	-0.2	9/4/05	13.8	8.6	0.0	0.1	5.2	-0.1
9/5/05	13.9	7.3	0.0	0.3	6.3	0.0	9/5/05	13.9	8.7	0.0	0.3	4.7	0.1
9/6/05	13.9	7.4	0.0	0.8	5.7	0.0	9/6/05	13.9	8.6	0.0	0.8	4.6	-0.1
9/7/05	13.9	7.7	0.0	0.0	5.8	0.3	9/7/05	13.9	8.7	0.0	0.0	5.0	0.1
9/8/05	13.9	7.9	0.0	0.0	5.9	0.2	9/8/05	13.9	8.5	0.0	0.0	5.7	-0.2
9/9/05	14.2	7.7	0.0	0.1	6.5	-0.2	9/9/05	14.2	8.4	0.0	0.1	5.9	-0.1
9/10/05	14.6	7.5	0.0	0.0	7.3	-0.2	9/10/05	14.6	8.5	0.0	0.0	6.0	0.1
9/11/05	14.6	7.3	0.0	1.3	6.1	-0.2	9/11/05	14.6	8.4	0.0	1.3	4.9	0.0
9/12/05	13.1	7.3	0.0	0.0	5.8	0.0	9/12/05	13.1	7.8	0.0	0.0	5.9	-0.6
9/13/05	12.9	7.3	0.0	0.0	5.6	0.0	9/13/05	12.9	7.4	0.0	0.0	5.8	-0.4
9/14/05	12.1	7.1	0.0	0.5	4.8	-0.2	9/14/05	12.1	7.2	0.0	0.5	4.8	-0.3
9/15/05	12.5	6.2	0.0	0.2	7.0	-0.9	9/15/05	12.5	7.0	0.0	0.2	5.4	-0.1
9/16/05	12.4	9.1	2.0	0.2	2.1	2.9	9/16/05	12.4	9.3	2.0	0.2	2.6	2.3
9/17/05	11.0	8.1	0.0	0.1	3.8	-1.0	9/17/05	11.0	8.8	0.0	0.1	2.7	-0.5
9/18/05	10.3	6.9	0.0	0.2	4.5	-1.3	9/18/05	10.3	7.8	0.0	0.2	3.2	-0.9
9/19/05	13.8	6.6	0.2	1.0	6.8	-0.3	9/19/05	13.8	7.4	0.2	1.0	6.0	-0.4
9/20/05	13.6	6.2	0.3	0.2	7.9	-0.4	9/20/05	13.6	7.9	0.3	0.2	5.3	0.5
9/21/05	11.7	5.8	0.0	0.2	6.1	-0.4	9/21/05	11.7	8.7	0.0	0.2	2.0	0.8
9/22/05	11.1	5.7	0.0	1.0	4.4	-0.1	9/22/05	11.1	8.6	0.0	1.0	1.6	-0.1
9/23/05	9.2	6.6	0.3	0.1	1.8	0.9	9/23/05	9.2	6.8	0.3	0.1	4.5	-1.8
9/24/05	8.5	6.7	5.3	0.1	6.9	0.1	9/24/05	8.5	6.2	5.3	0.1	7.9	-0.5
9/25/05	7.8	6.7	0.1	0.2	1.1	-0.1	9/25/05	7.8	7.2	0.1	0.2	-0.4	1.0
9/26/05	7.1	6.6	2.2	0.0	2.8	-0.1	9/26/05	7.1	8.2	2.2	0.0	0.0	1.0
9/27/05	8.2	6.5	0.0	0.3	1.6	-0.1	9/27/05	8.2	9.4	0.0	0.3	-2.6	1.2
9/28/05	12.8	8.4	0.0	0.0	2.4	2.0	9/28/05	12.8	9.8	0.0	0.0	2.5	0.5
9/29/05	13.0	8.6	1.2	0.0	5.4	0.2	9/29/05	13.0	9.4	1.2	0.0	5.2	-0.4
9/30/05	12.8	9.5	0.0	0.0	2.3	0.9	9/30/05	12.8	9.8	0.0	0.0	2.7	0.3
10/1/05	12.7	8.8	0.0	0.1	4.5	-0.7	10/1/05	12.7	9.5	0.0	0.1	3.4	-0.3
10/2/05	12.6	8.0	0.0	0.0	5.3	-0.8	10/2/05	12.6	9.1	0.0	0.0	3.8	-0.4
10/3/05	12.6	8.0	0.0	0.0	4.7	-0.1	10/3/05	12.6	8.8	0.0	0.0	4.0	-0.3
10/4/05	12.8	8.3	0.0	0.0	4.2	0.3	10/4/05	12.8	8.9	0.0	0.0	3.8	0.0
10/5/05	13.9	7.4	0.0	0.0	7.3	-0.8	10/5/05	13.9	9.0	0.0	0.0	4.7	0.1
10/6/05	13.3	7.4	0.1	0.1	6.1	-0.1	10/6/05	13.3	8.8	0.1	0.1	4.8	-0.3
10/7/05	13.0	8.2	1.2	1.9	3.2	0.9	10/7/05	13.0	9.6	1.2	1.9	1.9	0.8
10/8/05	12.8	10.2	0.1	2.2	-1.5	2.0	10/8/05	12.8	9.8	0.1	2.2	0.7	0.2
10/9/05	12.5	10.4	0.0	0.0	1.9	0.2	10/9/05	12.5	9.9	0.0	0.0	2.6	0.1
10/10/05	12.6	6.6	0.0	0.2	9.7	-3.9	10/10/05	12.6	7.9	0.0	0.2	6.5	-2.0
10/11/05	12.4	5.9	0.0	1.3	5.9	-0.7	10/11/05	12.4	9.0	0.0	1.3	0.9	1.2
10/12/05	12.0	7.9	0.0	0.1	2.0	2.0	10/12/05	12.0	9.3	0.0	0.1	2.5	0.2
10/13/05	12.4	9.0	0.0	0.0	2.3	1.1	10/13/05	12.4	9.1	0.0	0.0	3.6	-0.2
10/14/05	11.3	7.4	0.0	2.0	3.4	-1.6	10/14/05	11.3	9.3	0.0	2.0	-0.3	0.3
10/15/05	11.3	3.9	0.0	0.2	10.7	-3.6	10/15/05	11.3	6.3	0.0	0.2	7.8	-3.0
10/16/05	11.3	1.6	0.0	0.1	11.9	-2.3	10/16/05	11.3	2.8	0.0	0.1	11.8	-3.4
10/17/05	12.4	1.0	0.0	0.0	11.9	-0.6	10/17/05	12.4	2.0	0.0	0.0	11.3	-0.9
10/18/05	13.0	6.7	0.0	0.0	0.6	5.7	10/18/05	13.0	6.7	0.0	0.0	1.5	4.8
10/19/05	12.8	3.6	0.0	0.1	12.4	-3.2	10/19/05	12.8	5.2	0.0	0.1	9.1	-1.6
10/20/05	12.7	5.5	0.7	1.1	4.9	1.9	10/20/05	12.7	5.3	0.7	1.1	6.9	0.1
10/21/05	12.3	7.2	1.6	0.1	4.9	1.7	10/21/05	12.3	8.3	1.6	0.1	2.4	3.0

Date	Inf.	Outf.	Precip.	Evap.	Seep	D Vol.	Date	Inf.	Outf.	Precip.	Evap.	Seep.	D Vol.
10/22/05	13.3	7.3	0.4	0.0	6.3	0.1	10/22/05	13.3	8.8	0.4	0.0	4.4	0.5
10/23/05	13.3	7.2	0.0	0.0	6.2	-0.1	10/23/05	13.3	8.6	0.0	0.0	4.9	-0.2
10/24/05	12.2	5.8	0.4	0.0	8.2	-1.4	10/24/05	12.2	6.0	0.4	0.0	9.2	-2.6
10/25/05	11.8	5.3	0.7	0.0	7.7	-0.5	10/25/05	11.8	6.2	0.7	0.0	6.2	0.2
10/26/05	10.2	3.2	0.0	0.1	9.0	-2.1	10/26/05	10.2	7.8	0.0	0.1	0.7	1.6
10/27/05	9.3	4.9	0.0	0.0	2.7	1.7	10/27/05	9.3	8.5	0.0	0.0	0.1	0.7
10/28/05	10.2	4.1	0.0	0.0	6.9	-0.8	10/28/05	10.2	8.3	0.0	0.0	2.2	-0.3
10/29/05	10.3	4.2	0.0	0.1	5.9	0.1	10/29/05	10.3	8.0	0.0	0.1	2.4	-0.2
10/30/05	2.2	2.8	0.0	0.1	0.7	-1.4	10/30/05	2.2	2.9	0.0	0.1	4.4	-5.1
10/31/05	0.5	0.4	0.0	0.5	1.9	-2.4	10/31/05	0.5	0.3	0.0	0.5	2.2	-2.5
11/1/05	0.0	0.9	0.8	0.0	-0.6	0.5	11/1/05	0.0	0.7	0.8	0.0	-0.2	0.3
11/2/05	3.7	1.6	0.0	0.0	1.3	0.7	11/2/05	3.7	1.0	0.0	0.0	2.3	0.4
11/3/05	10.3	2.3	0.0	0.0	7.3	0.7	11/3/05	10.3	4.2	0.0	0.0	3.0	3.2
11/4/05	11.6	6.6	0.0	0.0	0.6	4.3	11/4/05	11.6	7.7	0.0	0.0	0.3	3.6
11/5/05	9.5	5.1	0.0	0.0	6.0	-1.6	11/5/05	9.5	6.3	0.0	0.0	4.6	-1.4
11/6/05	9.1	4.6	0.3	0.1	5.3	-0.5	11/6/05	9.1	5.9	0.3	0.1	3.8	-0.4
11/7/05	7.8	4.3	0.0	0.0	3.7	-0.3	11/7/05	7.8	6.0	0.0	0.0	1.8	0.1
11/8/05	8.1	3.5	0.1	0.1	5.5	-0.8	11/8/05	8.1	4.2	0.1	0.1	5.7	-1.7
11/9/05	8.2	2.5	0.8	0.1	7.4	-1.0	11/9/05	8.2	2.7	0.8	0.1	7.8	-1.6
11/10/05	10.9	1.5	0.0	0.0	10.4	-1.0	11/10/05	10.9	1.5	0.0	0.0	10.7	-1.2
11/11/05	10.8	4.9	0.0	0.0	2.6	3.3	11/11/05	10.8	4.1	0.0	0.0	4.1	2.6
11/12/05	9.8	6.8	0.0	0.0	1.1	1.9	11/12/05	9.8	6.0	0.0	0.0	1.8	2.0
11/13/05	9.8	6.8	0.1	0.0	3.2	0.0	11/13/05	9.8	7.0	0.1	0.0	2.0	1.0
11/14/05	10.3	6.5	1.3	0.5	4.9	-0.3	11/14/05	10.3	7.4	1.3	0.6	3.3	0.4
11/15/05	11.4	5.8	2.7	0.1	8.9	-0.7	11/15/05	11.4	7.7	2.7	0.1	6.0	0.3
11/16/05	11.0	5.7	0.5	0.2	5.7	-0.1	11/16/05	11.0	6.5	0.5	0.2	6.0	-1.2
11/17/05	2.8	3.3	0.0	0.0	1.9	-2.4	11/17/05	2.8	5.1	0.0	0.0	-1.0	-1.4
11/18/05	0.4	3.5	0.0	0.1	-3.4	0.2	11/18/05	0.4	2.8	0.0	0.1	-0.2	-2.3
11/19/05	2.5	4.4	0.0	0.0	-2.8	0.9	11/19/05	2.5	1.4	0.0	0.0	2.4	-1.4
11/20/05	5.4	4.2	0.0	0.0	1.3	-0.1	11/20/05	5.4	1.4	0.0	0.0	4.0	0.0
11/21/05	7.8	4.1	0.0	0.0	3.8	-0.1	11/21/05	7.8	1.8	0.0	0.0	5.6	0.4
11/22/05	7.5	4.0	0.0	0.1	3.6	-0.2	11/22/05	7.5	4.5	0.0	0.1	0.3	2.7
11/23/05	7.3	3.0	0.4	0.3	5.4	-1.0	11/23/05	7.3	4.4	0.4	0.3	3.0	0.0
11/24/05	7.3	2.8	0.1	0.0	4.7	-0.1	11/24/05	7.3	4.3	0.1	0.0	3.3	-0.1
11/25/05	7.2	2.8	0.0	0.0	4.4	0.0	11/25/05	7.2	4.3	0.0	0.0	2.9	0.0
11/26/05	7.0	2.8	0.0	0.0	4.2	0.0	11/26/05	7.0	4.3	0.0	0.0	2.7	0.0
11/27/05	6.6	2.8	0.1	0.0	3.9	0.0	11/27/05	6.6	4.3	0.1	0.0	2.4	0.0
11/28/05	1.2	2.6	0.7	0.1	-0.5	-0.2	11/28/05	1.2	4.3	0.7	0.1	-2.4	0.0
11/29/05	1.5	3.0	1.1	0.0	-0.9	0.5	11/29/05	1.5	4.6	1.1	0.0	-2.2	0.3
11/30/05	6.3	7.1	0.0	0.1	-4.9	4.0	11/30/05	6.3	7.4	0.0	0.1	-4.1	2.9
12/1/05	8.2	7.3	0.0	0.0	0.7	0.2	12/1/05	8.2	4.9	0.0	0.0	5.8	-2.5
12/2/05	1.6	6.4	0.0	0.0	-4.0	-0.9	12/2/05	1.6	3.7	0.0	0.0	-0.8	-1.3
12/3/05	0.0	5.3	0.0	0.0	-4.2	-1.1	12/3/05	0.0	3.1	0.0	0.0	-2.6	-0.5
12/4/05	1.7	4.6	0.0	0.0	-2.1	-0.8	12/4/05	1.7	2.8	0.0	0.0	-0.7	-0.4
12/5/05	8.2	4.5	0.0	0.0	3.7	-0.1	12/5/05	8.2	3.2	0.0	0.0	4.6	0.4
12/6/05	3.0	4.5	0.0	0.0	-1.5	0.0	12/6/05	3.0	2.6	0.0	0.0	1.0	-0.6
12/7/05	7.1	5.5	0.1	0.0	0.8	0.9	12/7/05	7.1	2.9	0.1	0.0	4.0	0.3
12/8/05	1.6	6.0	0.0	0.0	-4.9	0.5	12/8/05	1.6	4.0	0.0	0.0	-3.5	1.1
12/9/05	2.7	6.0	0.0	0.1	-3.5	0.0	12/9/05	2.7	4.8	0.0	0.1	-3.0	0.8
12/10/05	4.9	6.0	0.0	0.0	-1.1	0.0	12/10/05	4.9	3.4	0.0	0.0	3.0	-1.4
12/11/05	7.2	6.0	0.2	0.0	1.3	0.0	12/11/05	7.2	2.3	0.2	0.0	6.2	-1.1
12/12/05	9.1	6.0	0.1	0.0	3.2	0.0	12/12/05	9.1	2.6	0.1	0.0	6.2	0.4
12/13/05	9.3	5.7	0.1	0.0	3.9	-0.3	12/13/05	9.3	3.7	0.1	0.0	4.6	1.1
12/14/05	9.3	5.5	0.0	0.0	4.1	-0.3	12/14/05	9.3	3.8	0.0	0.0	5.4	0.1
12/15/05	8.4	5.9	0.6	0.0	2.7	0.4	12/15/05	8.4	3.9	0.6	0.0	4.9	0.1
12/16/05	2.4	5.5	0.1	0.0	-2.7	-0.4	12/16/05	2.4	3.0	0.1	0.0	0.4	-0.9
12/17/05	2.7	5.5	0.0	0.0	-2.9	0.1	12/17/05	2.7	4.2	0.0	0.0	-2.8	1.3
12/18/05	5.9	5.9	0.0	0.0	-0.3	0.3	12/18/05	5.9	2.8	0.0	0.0	4.6	-1.5
12/19/05	9.0	6.2	0.0	0.0	2.5	0.3	12/19/05	9.0	2.9	0.0	0.0	5.9	0.1
12/20/05	9.9	6.5	0.0	0.0	3.2	0.3	12/20/05	9.9	5.3	0.0	0.0	2.3	2.4

Date	Inf.	Outf.	Precip.	Evap.	Seep	D Vol.	Date	Inf.	Outf.	Precip.	Evap.	Seep.	D Vol.
12/21/05	10.0	6.6	0.0	0.0	3.1	0.2	12/21/05	10.0	3.8	0.0	0.0	7.6	-1.5
12/22/05	10.1	6.1	0.0	0.2	4.2	-0.5	12/22/05	10.1	2.7	0.0	0.2	8.2	-1.1
12/23/05	9.8	6.2	0.0	0.1	3.4	0.1	12/23/05	9.8	2.7	0.0	0.1	7.1	-0.1
12/24/05	9.4	6.4	0.0	0.1	2.8	0.2	12/24/05	9.4	2.2	0.0	0.1	7.6	-0.5
12/25/05	9.1	6.6	0.9	0.1	3.1	0.2	12/25/05	9.1	1.8	0.9	0.1	8.4	-0.4
12/26/05	8.3	6.6	0.1	0.0	1.6	0.1	12/26/05	8.3	2.7	0.1	0.0	4.7	0.9
12/27/05	5.0	5.9	0.0	0.0	-0.2	-0.7	12/27/05	5.0	2.8	0.0	0.0	2.1	0.1
12/28/05	1.7	5.1	0.0	0.0	-2.7	-0.7	12/28/05	1.7	2.1	0.0	0.0	0.3	-0.7
12/29/05	8.4	5.9	0.1	0.1	1.8	0.8	12/29/05	8.4	2.4	0.1	0.1	5.7	0.4
12/30/05	5.5	5.9	0.0	0.1	-0.4	-0.1	12/30/05	5.5	3.4	0.0	0.1	1.0	1.0
12/31/05	8.4	4.5	0.1	0.0	5.4	-1.4	12/31/05	8.4	7.3	0.1	0.0	-2.7	3.9